

East Penn School District
Secondary Curriculum

A Planned Course Statement
for
Programming Foundations

Course #323

Grade(s) 9-12

Department: Computer Science

Length of Period (mins.) 41

Total Clock Hours 63

Periods per Week 5

Length of Course (yrs.) .5

Type of Offering: required 4 elective

CREDIT .5

Adopted 04/27/09

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Description of Course #323

Course Title: Programming Foundations

Description: This course is designed to enable all students to develop better problem solving skills that will prepare them for many different fields of study and future computer science courses. By using the Visual BASIC programming language, students will learn to create a graphical user interface similar to a Windows-based environment. Students will learn how to write simple programs that include input, output, assignment, decisions, loops, strings, and possibly arrays. Programming assignments will relate to a variety of real-life applications.

Goals:

- To enable students to write programs that incorporate good structure, user-oriented interfaces, and sound problem solving strategies.

Requirements:

Prerequisite: Computer Science Foundations (recommended 80% or better), Honors Algebra I, or prior programming experience.

Text:

Brown, Beth, Presley, Bruce. An Introduction to Programming Using Microsoft Visual BASIC.Net, Lawrenceville Press, 2003.

Key to Levels of Achievement (listed with each learning objective)

Awareness (A)	Students are introduced to concepts, forms, and patterns.
Learning (L)	Students are involved in a sequence of steps and practice activities which involve further development and allow for evaluation of process.
Understanding (U)	Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level.
Reinforcement (R)	Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication.

Unit	Num	Objective	Level	Content	Evaluation	Standard
I. Computer History	1	Students will articulate a brief history of electronic computers – summarizing key inventors/inventions during each of the four generations of computers.	A	<ul style="list-style-type: none"> ● Early devices-Charles Babbage, Augusta Ada Byron ● First Generation- vacuum tubes, ENIAC, UNIVAC ● Second Generation – transistors, Grace Hopper ● Third Generation – integrated circuit ● Fourth Generation – microprocessor 	Paper	ISTE 3.b
	2	Students will compare and contrast hardware components of today’s computers to those in early generations.	A	<ul style="list-style-type: none"> ● Central processing unit ● Memory ● Storage devices 	Paper	ISTE 3.b
II. Introduction to Visual Basic	3	Students will understand the concepts behind object-oriented programming languages.	A	<ul style="list-style-type: none"> ● Objects have properties, procedures, and events. 		
	4	Students will use the Visual Basic Integrated Development Environment (IDE) to manage projects.	L	<ul style="list-style-type: none"> ● Creating a project. ● Adding a form to the project ● Use of toolbox ● Solution explorer window ● Properties window 		
	5	Students will use proper naming conventions for object types.	L	<ul style="list-style-type: none"> ● Naming conventions for <ul style="list-style-type: none"> • form, label, command button, text box, picture box 		
	6	Students will create forms and add objects.	L	<ul style="list-style-type: none"> ● The objects they will add to the form are: label, picture box, and command button. 	Programs	ISTE 4.b ISTE 4.d
	7	Students will change objects’ properties at design time and through coding.	L	<ul style="list-style-type: none"> ● Utilize properties explorer to change the caption, name, font, and alignment properties. 		
	8	Students will add comments to procedure code.	L	<ul style="list-style-type: none"> ● Start with an “” and are ignored by the computer. ● Documentation block contains name, class, period, date, and 		

Unit	Num	Objective	Level	Content	Evaluation	Standard
				purpose of program.		
	9	Students will understand and change event procedures.	L	<ul style="list-style-type: none"> ● On-click ● Form load 		
III. Variables and Constants	10	Students will use all data types and use proper naming conventions for each type.	L	<ul style="list-style-type: none"> ● Valid data types are integer, double, string, and Boolean. ● Naming conventions – no spaces or special characters, must start with letter. 		
	11	Students will declare and use variables and constants, identifying the most appropriate data type to use.	L	<ul style="list-style-type: none"> ● Integers represent whole numbers and decimals are a double. ● Constants are used for values that don't change (sales tax, pi, etc). 		
	12	Students will assign values to variables.	L	<ul style="list-style-type: none"> ● Assignment statements ● Input from text box ● Calculation ● Input from input box 		
IV. Sequential Structure	13	Students will design a form and write program code to obtain data from the user, calculate, and output results.	U	<ul style="list-style-type: none"> ● Inputting from a text box versus input box. ● Order of operations ● Integer division and mod ● Built-in functions ● Formatting output 	Programs: <ul style="list-style-type: none"> ● Circle calculations ● Test averages ● Mad-lib ● Investment income ● Baseball statistics ● Money changer 	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	14	Students will differentiate between a syntax error and a run-time error.	L	<ul style="list-style-type: none"> ● Syntax error – use of compiler to debug program. ● Run-time error – utilizing test data to determine error. 	Unit Test	
V. Decision Structure	15	Students will use logical and relational operators.	L	<ul style="list-style-type: none"> ● Use of and/or/not for evaluating relational expressions ● The precedence of not/and/or 		

Unit	Num	Objective	Level	Content	Evaluation	Standard
	16	Students will use the If...Then, If...Then...Else, and If...Then...Elseif statements.	U	<ul style="list-style-type: none"> ● Use of If...Then for one-way selection ● Use of If...Then...Else for two-way selection ● Use of If...Then...Elseif for multi-way selection 	Programs: <ul style="list-style-type: none"> ● Calculate wages ● Commission ● Writing equations of lines 	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	17	Students will use decision structure for option buttons and check boxes.	U	<ul style="list-style-type: none"> ● Option buttons <ul style="list-style-type: none"> ● Only one may be selected ● If...Then...Else structure ● Message box if no option is selected. ● Check boxes <ul style="list-style-type: none"> ● Successive of If...Then's ● All, many, or none can be checked 	Programs: <ul style="list-style-type: none"> ● Height conversion ● Subway ● Area of a triangle 	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	18	Students will use a message box to validate data.	L	<ul style="list-style-type: none"> ● Use of message box with exit sub for data validation. 	Programs – used in previously mentioned programs. Unit Test	
VI. Repetition Structure	19	Students will generate random numbers.	L	<ul style="list-style-type: none"> ● Rand returns a seed value ● Randomize in the form load 		
	20	Students will use a For Loop in writing programs.	U	<ul style="list-style-type: none"> ● Basic syntax of For Loop ● Use of STEP to change the increment ● Use of list boxes to display data 	Programs: <ul style="list-style-type: none"> ● Sum of numbers ● Factorial of a number ● Penny a day ● Compound interest ● Dice simulation 	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	21	Students will use a While Loop in writing programs.	U	<ul style="list-style-type: none"> ● Basic syntax of While Loop ● Use of sentinel controlled loop ● Use of query loop ● Use of post-test loop 	Programs: <ul style="list-style-type: none"> ● Bowling scores ● Hi/Low game ● 21 ● Euclid's algorithm ● Credit Card 	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	22	Students will use counters and accumulators in calculations.	L	<ul style="list-style-type: none"> ● A counter is used to count how many times a loop is executed. ● An accumulator is used to add up a sum. 		

Unit	Num	Objective	Level	Content	Evaluation	Standard
	23	Students will understand the difference between a definite and indefinite loop structure and when to use each.	U	<ul style="list-style-type: none"> ● Definite loop structure – For Loop, know in advance number of times loop will run. ● Indefinite loop structure – While Loop, don't know in advance how many times loop will run. 	Programs: <ul style="list-style-type: none"> ● Bowling scores ● Hi/Low game ● 21 ● Euclid's algorithm ● Credit Card Homework	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	24	Students will use nested statements.	U	<ul style="list-style-type: none"> ● Nesting For Loops ● Combination of nesting other loops 	Programs: <ul style="list-style-type: none"> ● Sum of two numbers ● Pythagorean triples ● Prime numbers ● Multiplication table Homework Unit Test	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
VII. String Manipulation	25	Students will use string functions to compare strings; investigate, manipulate, and convert strings.	U	<ul style="list-style-type: none"> ● Use of: string, space, LCASE, UCASE, right, left, mid, len, chr, and asc functions. ● Use of instr to compare two strings 	Programs: <ul style="list-style-type: none"> ● String patterns ● Palindrome ● Search and replace 	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
	26	Students will use concatenation of strings.	U	<ul style="list-style-type: none"> ● Building a string using sub-strings. 	Programs: <ul style="list-style-type: none"> ● Multiplication table ● Prime numbers Quiz	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c
VIII. Arrays	27	Students will understand variable arrays and elements of the array.	L	<ul style="list-style-type: none"> ● Use of arrays to store multiple values of the same type. 		
	28	Students will create an array, use a loop to initialize the array, and use the index to access elements in the array.	L	<ul style="list-style-type: none"> ● Syntax for declaring an array ● A For...Next loop is used to access elements in the array. ● Subscript out of bound error occurs when index is outside the last index. 		
	29	Students will solve problems using arrays to do table lookups, frequency tables, and sorting.	U	<ul style="list-style-type: none"> ● Table lookup – use of parallel arrays to store related information. ● Frequency distribution use of index for tallies. ● Use of sorting algorithms to arrange data in ascending or descending order. 	Programs: <ul style="list-style-type: none"> ● Payroll ● Postage calculations ● Frequency of test score data ● Tally results of a survey ● Hangman ● Sort students by rank Quiz	ISTE 3.d ISTE 4.b ISTE 4.d ISTE 6.c

